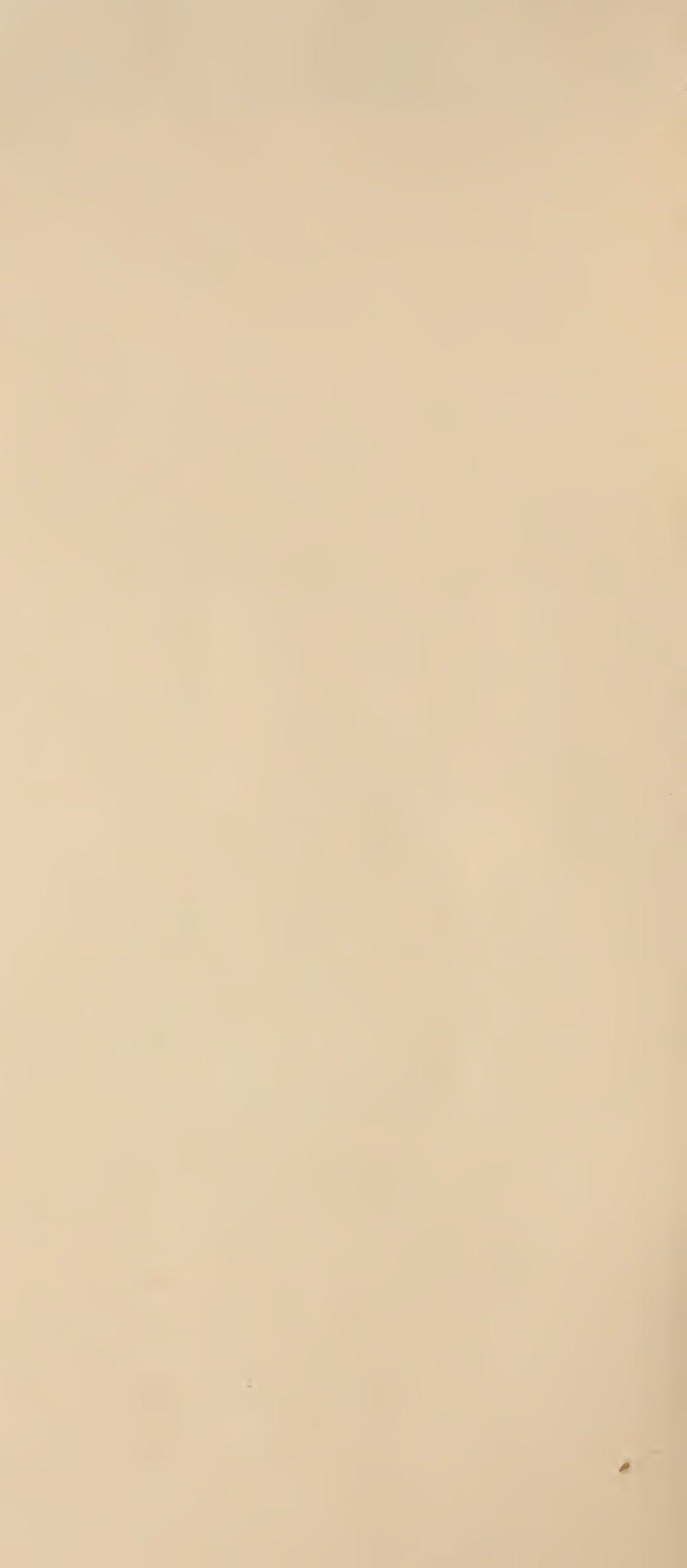


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THE KHAPRA BEETLE

A PEST OF
STORED GRAINS
AND CEREAL
PRODUCTS



PA-436

U.S. DEPARTMENT OF AGRICULTURE

The khapra beetle is a relatively new insect pest in the United States. It seriously damages stored cereal products, and feeds on whole kernels of stored cereal grains—wheat, corn, barley, oats, rye, and rice. It also attacks stored seed, cottonseed meal, nut meats, dried fruits, and other products of plant or animal origin.

This pest causes severe losses of infested products. Total loss can be expected when infested grain is left undisturbed in storage for long periods. The insect has become a threat to billions of bushels of important products stored in the United States.

THE KHAPRA BEETLE



Adult khapra beetle.



ORIGIN AND SPREAD

The khapra beetle, first described in 1898, is a native of India, Ceylon, and Malaya. It now occurs in Great Britain, Japan, the Philippines, Australia, and numerous countries of Europe, Asia, and Africa. While it is believed this pest may have been in the United States as early as 1939, it was not until 1953 that it was discovered in California. Since 1954 the khapra beetle has been found in Arizona, New Mexico, Texas, and the Republic of Mexico. Infested properties are immediately scheduled for fumigation when they are found.



Khapra-beetle larvae feeding on stored corn.

ERADICATION PROGRAM

A continual, cooperative program of eradication is being carried out by the U.S. Department of Agriculture, the affected States, and Mexico. New infestations are treated as soon as possible after they are discovered.

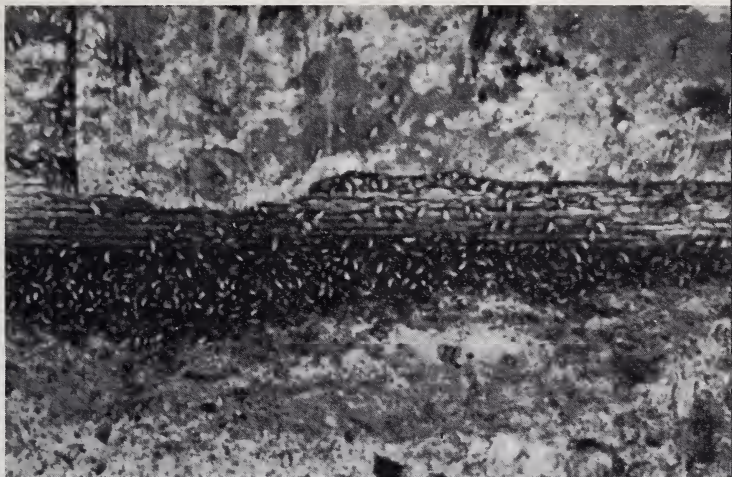
EARLY DETECTION

It is important to locate infestations at an early stage. Then, eradication measures can be started in time to prevent serious damage and stop spread of the pest to new localities.

The khapra beetle is difficult to detect because of its size—it is only about $\frac{1}{8}$ inch long. Detection surveys are made repeatedly by State and Federal entomologists in States where infestations exist. They are made periodically in principal storage areas throughout the United States and Mexico. But these surveys are not adequate to prevent further spread of the pest. Help is needed from all handlers of stored products—farmers; operators of grain, feed, and seed houses; trucking and railway companies; and food storage concerns.

QUARANTINE

Whenever an infestation is found, the site is placed under regulation; cooperative eradication measures are begun. To



Khapra-beetle larvae, ready to pupate, congregated in corner of grain bin.

meet the requirements of the quarantine regulations, stored products and all articles exposed to the khapra beetle must be treated and certified free of infestation before they may be moved from an infested site. Eradication procedures are carried out by private fumigation operators, under contract to, and under supervision of, State or Federal agencies.

Ports of entry.—Domestic freight traffic is increasing and ocean-going cargo ships are plying the St. Lawrence Seaway. Because of this, inspections have been intensified to prevent the khapra beetle from reaching vital midwest storage facilities. Interceptions have been numerous and Federal quarantine inspectors are constantly on the alert to detect the presence of the khapra beetle at ports of entry.

ERADICATION TREATMENT

The khapra beetle cannot be eradicated by using conventional insecticide sprays or the customary dosages of grain-treatment fumigants. Special measures must be employed to destroy the pest. Methyl bromide and hydrogen cyanide gases are effective fumigants when used at concentrations higher than those necessary to kill other grain pests. These high concentrations must be used only under supervision of a specialist.

The quickest eradication treatment that meets provisions of quarantine regulations is as follows:

All storage buildings are wrapped with gas-tight tarpoulins in preparation for fumigating the stored products and the structures with methyl bromide gas. At the rate of 5 pounds per 1,000 cubic feet, gas is introduced into the chamber formed by the tarpoulins, and is held there for 48 hours. For at least 24 hours of this period, gas concentration is maintained at predetermined level in the stored products, and throughout the fumigation chamber. Gas concentration is determined by running a number of tubes to various locations in the chamber; samples of gas are drawn off through these tubes at regular intervals, and passed through a gas analyzer.

The oreo surrounding infested structures is treated three times, at 3- to 7-day intervals, with a spray containing 5 pounds of malathion in each 100 gallons of diesel fuel. The sroyed areo is roked or horrowed between applications to assure wetting of all debris and other materiol.

When infested premises are treated in this monner, they can be released from regulotion immediately. If infestations ore light, other approved procedures may be employed at discretion of Federal or State control supervisors. Only part of the structures on on infested premise may be treated, or structures may be treated without draping with tarpoulins. If the modified procedures are used, the infested premises must remain under regulation for a year. Three inspections at least 90 days opart—the final one during the last month of the period of regulation—must show that the premises ore free of infestation. Then they can be released from regulation.

HOW YOU CAN HELP

- Watch for this pest; look for it porticularly in grain and grain products that hove been stored for an extended period.
- Examine sacks and other containers, to find any infestations. Do this before shipment, and before the containers are reused for stored products. Sacks or containers showing presence of stored-product insect pests should be fumigated before reusing.
- Report suspected khapra beetle infestations to State or Federal plant pest control inspectors, or to your county agricultural agent.
- Collect samples of suspected insects, and place them in viols containing rubbing alcohol or grain alcohol. Give the somples to the above-named officials, or mail them to the Plant Pest Control Division, U.S. Department of Agriculture, Washington 25, D.C. Do not mail live specimens of khapra beetles. Include your return address with a note stating that the samples ore suspected of being khapra beetles.
- Comply with all quarantine regulations. Cooperate with program personnel in eradicoting the pest if it is found on your premises.

DEVELOPMENT AND HABITS

The development of the khapra beetle has four stages—egg, larva, pupa, and adult. The length of the life cycle (egg to adult) varies from 26 days at 93°–95° to 220 days at 70°. The insects may die during development at temperatures under 40° or aver 104°.

Eggs ore about 1/64 inch long, and white.

Larvae are yellowish-white upon hatching; they change to reddish-brown as they shed their skins 2 to 11 times. They are about 1/4 inch long when full grown.

Pupae are about 1/4 inch long, and are enclosed in the last larvol skin.

Adult moles are small, brownish-black beetles, about 1/8 inch long. Adult females ore o little longer, and lighter in color.

Young larvoe are unable to feed on whole kernels of grain, and depend upon damaged kernels or grain products for food. Older larvoe can feed on whole grains. The amount of food present is a factor in the speed of their development, but larvae can survive long periods without food. Adults feed very little, if at all.

The khopra beetle feeds only on stored products—never on growing crops. The beetle cannot fly, so its movement is limited. Activity of the insect is generally confined to the top 12 inches of grain, although it has been found as deep os 12 feet, porticularly in corners and along walls of bins.

The insects crowd into cracks in masonry, woodwork, and cortons, into creoses of sacks, in debris, and in other protected ploces where they ore difficult to find.

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Barley infested by khapra-beetle larvae.

BN-9570X



Khapra-beetle larvae in lima beans.

BN-9434X



Searching far khapra beetles in grain scattered on railroad siding outside storage buildings.

BN-2745X



Grain elevator encased in plastic-coated nylon tarpaulins during fumigation to kill khapra beetles.